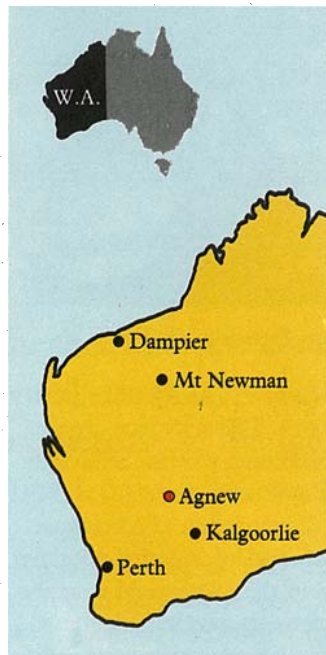


Dust in new desert towns

For most of us dust and deserts go together. Towns in such places tend to be dusty, so keeping levels as low as possible is important.

Australian Selection Pty Ltd was looking into the feasibility of developing nickel mines on its leases at Agnew, some 200 km north-west of Kalgoorlie in Western Australia. Developing mines there would require building a township close by. Knowing that dust would be a problem in an area with a mean annual rainfall of only 200 mm, the company approached the CSIRO Division of Land Resources Management for advice.



Agnew, Western Australia—the proposed site.

Dr John Marshall and Mr Max Churchward, from the Division, visited the site and prepared a report last year that laid down guidelines on how the company should go about developing the town.

Although the guidelines were produced for a town at Agnew, most of them could be applied just as well to the planning of any other community in arid areas. In fact, many of the recommendations could be applied in less dry regions as well.

Most of the recommendations seem like good common sense, but that doesn't detract from them. The over-riding principle in the two researchers' minds was that prevention is better than cure. Carrying out landscape restoration can be very expensive, and is seldom completely effective.

Two major factors cause erosion, and hence dust: wind and water. Keeping the soil from becoming compacted, so that the water sinks in, and protecting it from the impact of raindrops keep water erosion to a minimum. The best measures against wind erosion are keeping the surface topography as rough as possible and keeping areas susceptible to wind erosion small.



Dr Marshall and Mr Churchward suggest that, over the whole general area of the township, the best practical measures would be to retain as much natural vegetation as possible, to preserve shelter belts and clumps of natural vegetation, and to maintain a buffer area of natural vegetation about 1 km wide around the edge of the town.

The important thing about the shelter belts and the buffer areas is that they should be marked out and fenced before the town development even starts. The researchers point out that natural vegetation in arid climates is very easily disturbed and killed by vehicles, or by grazing animals. Many trees in the natural vegetation of areas marked out for retention would be more than 50 years old. Replacing these with planted ones when water is short would take a very long time.

Planning such natural zones would require that an expert consultant first did a vegetation survey to pick out suitable areas. Ideally, the shelter belts should run across the prevailing winds and be thick enough to only allow between one-third and one-half of the wind through.

To be most effective, the belts should be no further apart than 20 times their height.

A vegetation survey would also point to suitable plants for growing on disturbed areas.

The scientists make a number of suggestions for more localized problems. For example, within the town, roads should be curved. Long straight sections, particularly in the direction of the prevailing winds, give winds a long fetch that allows them to pick up greater speed near the ground. Obviously, the roads should also be sealed. Less obviously, it's far better to stagger houses along the roadside than to place them in the traditional straight lines. Staggered houses help to reduce the wind speed.

Solid fences are not recommended. Solid surfaces like fences and houses create turbulence that accelerates the wind, thus increasing its erosion powers—at least over a small area. As with the shelter belts of natural vegetation, lath fences should let through between one-half and one-third of the wind. Extending these fences from the corners of houses, sheds, and other buildings reduces the turbulence that these create as well.

Incidentally, a detail worth remembering is that the laths should be horizontal rather than vertical, since placed in this way they remain more uniformly permeable to winds from different directions.

In addition to the retained native vegetation, the researchers recommend that additional shelter belts, hedges, gardens, and street trees should be planted. All of these help to keep the dust down by minimizing wind and water erosion, as well as making the township more attractive to live in.

Of course, the mining operations themselves can be a major source of dust within the town. Making sure that the town is not located down wind is the most obvious way of avoiding this kind of problem.

However, Dr Marshall and Mr Churchward also suggested a number of measures for keeping down the dust at the mining operations themselves. Most of these involve carefully controlling where staff drive equipment and generally disturb the landscape. Heavy equipment moving about, and thus com-

pacting the soil or scraping off the topsoil to expose impermeable layers, increases the amount of surface water. This leads to both water and wind erosion.

Finally, when planning roads, it's worth remembering that on flat arid plains the natural flow of surface water is in broad and shallow water-courses.

Concentrating the flow in any way encourages erosion. Interrupting and altering the surface drainage patterns can result in a lot of water banking up over a large area of countryside, or in washouts

of roads, as well as channeling the flow. In addition, less water may reach the vegetation down slope, and so it dies.

Roads and other constructions should therefore be built with long, low culverts and spillways to avoid diverting or concentrating the flow.

Dust abatement at Agnew, Western Australia. J. K. Marshall and H. M. Churchward. *CSIRO Division of Land Resources Management, Management Report No. 1*, 1974.